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*DB=USPT; PLUR=YES; OP=ADJ*

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☐ 2. Document ID: US 6482571 B1

L17: Entry 2 of 3

File: USPT

Nov 19, 2002

DOCUMENT-IDENTIFIER: US 6482571 B1

TITLE: On-press development of thermosensitive lithographic platesAbstract Text (1):

This patent describes on-press ink and/or fountain solution development of lithographic plates having on a substrate a thermosensitive layer capable of hardening or solubilization upon exposure to an infrared laser radiation. The plate can be imagewise exposed with an infrared laser and then on-press developed with ink and/or fountain solution by rotating the plate cylinder and engaging ink and/or fountain solution roller. The developed plate can then directly print images to the receiving sheets. The imagewise exposure can be performed off the press or with the plate being mounted on the plate cylinder of a lithographic press.

US Patent No. (1):6482571Brief Summary Text (2):

This invention relates to lithographic printing plates. More particularly, it relates to on-press ink and/or fountain solution development of lithographic plates having on a substrate a thermosensitive layer capable of hardening or solubilization upon exposure to an infrared laser radiation.

Brief Summary Text (6):

On-press developable lithographic printing plates have been disclosed in the literature. Such plates can be directly mounted on press after exposure to develop with ink and/or fountain solution during the initial prints and then to print out regular printed sheets. No separate development process before mounting on press is needed. Among the patents describing on-press developable lithographic printing plates are U.S. Pat. Nos. 5,258,263, 5,516,620, 5,561,029, 5,616,449, 5,677,110, 5,811,220, 6,014,929, and 6,071,675.

Brief Summary Text (15):

Despite the progress in conventional on-press developable plates and digital laser imagable plates there is a desire for a lithographic plate which can be imaged by thermal laser (infrared laser), does not produce ablation debris, and does not require a separate liquid development process. More specifically, there is a desire for a thermosensitive lithographic plate which is on-press developable with ink and/or fountain solution.

Brief Summary Text (17):

It is an object of this invention to provide a thermosensitive lithographic plate which is on-press developable with ink and/or fountain solution.

Brief Summary Text (18):

It is another object of this invention to provide a method of on-press developing a thermosensitive lithographic plate comprising on a substrate a thermal sensitive layer which is on-press developable with ink and/or fountain solution.

Brief Summary Text (19):

It is yet another object of this invention to provide a method of on-press imaging and developing a thermosensitive lithographic plate comprising on a substrate a thermosensitive layer which is on-press developable with ink and/or fountain solution.

Brief Summary Text (22):

The plate can be imagewise exposed with an infrared laser on a plate exposure device and then transferred to a lithographic press for on-press development with ink and/or fountain solution by rotating the plate cylinder and engaging ink and/or fountain solution roller. The developed plate can then directly print images to the receiving sheets (such as papers). Alternatively, the plate can be imagewise exposed with

infrared laser while mounted on a plate cylinder of a lithographic press, on-press developed on the same press cylinder with ink and/or fountain solution, and then directly print images to the receiving sheets.

Brief Summary Text (27):

Thermosensitive layer suitable for the current invention may be formulated from various thermosensitive materials containing an infrared absorbing dye or pigment. The composition ratios (such as monomer to polymer ratio) are usually different from conventional plates designed for development with a regular liquid developer. Various additives may be added to, for example, allow or enhance on-press developability. Such additives include surfactant, plasticizer, water soluble polymer or small molecule, and ink soluble polymer or small molecule. The addition of nonionic surfactant is especially helpful in making the thermosensitive layer dispersible with ink and fountain solution, or emulsion of ink and fountain solution. Various additives useful for conventional thermosensitive layer can also be used. These additives include pigment, dye, exposure indicator, and stabilizer.

Brief Summary Text (33):

Various surfactants may be added into the thermosensitive layer to allow or enhance the on-press ink and/or fountain solution developability. Both polymeric and small molecule surfactants can be used. However, it is preferred that the surfactant has low or no volatility so that it will not evaporate from the photosensitive layer of the plate during storage and handling. Nonionic surfactants are preferred. The nonionic surfactant used in this invention should have sufficient portion of hydrophilic segments (or groups) and sufficient portion of oleophilic segments (or groups), so that it is at least partially soluble in water (>1 g surfactant soluble in 100 g water) and at least partially soluble in organic phase (>1 g surfactant soluble in 100 g photosensitive layer). Preferred nonionic surfactants are polymers and oligomers containing one or more polyether (such as polyethylene glycol, polypropylene glycol, and copolymer of ethylene glycol and propylene glycol) segments. Examples of preferred nonionic surfactants are block copolymers of propylene glycol and ethylene glycol (such as Tergitol MIMFOAM from Union Carbide, and Pluronic L43, L64, 1107, P103 and 10R5 from BASF); ethoxylated or propoxylated acrylate oligomers (such as polyethoxylated (20) trimethylolpropane triacrylate, polyethylene glycol (600) diacrylate, and polypropoxylated (6) trimethylolpropane triacrylate, SR415, SR610, and SR501, respectively, from Sartomer Company, Exton, Pa.); and polyethoxylated alkylphenols and polyethoxylated fatty alcohols (such as Triton X-100, Triton X-102, Triton X-165, Triton X-305, Triton X-405, Triton X-705, Triton X-45, Triton X-114, Triton CF-10, Triton CA, and Triton DF-12 from Union Carbide). The nonionic surfactant can be added at 0.5 to 30% by weight of the thermosensitive layer, preferably 1 to 15%.

Brief Summary Text (44):

Emulsion of ink and fountain solution is an emulsion formed from ink and fountain solution during wet lithographic printing process. Because fountain solution (containing primarily water) and ink are not miscible, they do not form stable emulsion. However, emulsion of ink and fountain solution can form during shearing, compressing, and decompressing actions by the rollers and cylinders, especially the ink rollers and plate cylinder, on a wet lithographic press. For wet press with integrated inking system, ink and fountain solution are emulsified on the ink rollers before transferred to the plate.

Brief Summary Text (47):

In one embodiment of this invention, the plate is imagewise exposed with an infrared laser radiation in a plate imaging device, and the exposed plate is subjected to on-press development with ink (for waterless plate) or with ink and/or fountain solution (for wet plate). The plate is mounted on the press cylinder as for a conventional plate to be printed. The press is then started to contact the plate with ink (for waterless plate) or with ink and/or fountain solution (for wet plate) to develop the plate, and to lithographically print images from said plate to the receiving medium (such as papers). Good quality prints should be obtained preferably under 20 initial impressions, more preferably under 10 impressions, most preferably under 5 impressions.

Brief Summary Text (49):

Optionally, if needed, the exposed plate can be subjected to an overall baking or heating process with a heating device such as an oven or an infrared lamp, before on-press development with ink and/or fountain solution. Such a heating process may be performed (for example, with an infrared lamp) while the plate is mounted on the plate cylinder of the lithographic press. For negative working plates, the overall baking or

heating can help enhance the hardening of the exposed areas.

Brief Summary Text (50):

For conventional wet press, usually fountain solution is applied (to contact the plate) first, followed by contacting with ink roller. For press with integrated inking system, the ink and fountain solution are emulsified by the various press rollers before transferred to the plate as emulsion of ink and fountain solution. However, in this invention, the ink and fountain solution may be applied at any combination or sequence, as needed for the plate. There is no particular limitation. The recently introduced single fluid ink by Flink Ink Company, which can be used for printing wet lithographic plate without the use of fountain solution, can also be used for the on-press development and printing of the plate of this invention.

Brief Summary Text (51):

Optionally, for wet lithographic plate, the plate may be applied with an aqueous solution, including water and fountain solution, to dampen without developing the plate, before on-press development with ink and/or fountain solution.

Detailed Description Text (4):

The exposed plate was subjected to hand test for on-press developability. The plate was rubbed back and forth for 10 times with a cloth soaked with both fountain solution (prepared from Superlene Brand All Purpose Fountain Solution Concentrate made by Varn, Oakland, N.J.) and ink (Sprinks 700 Acrylic Black ink from Sprinks Ink, FL) to check on-press developability and inking. The plate developed completely under 8 double rubs. The non-exposed areas of the thermosensitive layer were completely removed, and the exposed areas of the thermosensitive layer stayed on the substrate. The developed plate showed well inked imaging pattern in the exposed areas and clean background in the non-exposed areas.

Current US Original Classification (1):

430/302

Current US Cross Reference Classification (1):

101/453

Current US Cross Reference Classification (2):

101/454

Current US Cross Reference Classification (3):

101/456

Current US Cross Reference Classification (4):

101/457

Current US Cross Reference Classification (5):

101/465

Current US Cross Reference Classification (6):

101/467

CLAIMS:

1. A method of lithographically printing images on a receiving medium, comprising in order: (a) providing a lithographic plate comprising (i) a substrate; and (ii) a thermosensitive layer comprising a polymerizable monomer or oligomer, an initiator capable of initiating the polymerization of said monomer or oligomer, and an infrared absorbing dye or pigment; wherein said thermosensitive layer is capable of hardening upon exposure to an infrared laser radiation, is soluble or dispersible in and on-press developable with ink and/or fountain solution, and exhibits an affinity or aversion substantially opposite to the affinity or aversion of said substrate to at least one printing liquid selected from the group consisting of ink and an adhesive fluid for ink; (b) imagewise exposing the plate with the infrared laser radiation to cause hardening of the thermosensitive layer in the exposed areas; and (c) contacting said exposed plate with ink and/or fountain solution on a lithographic press to remove the thermosensitive layer in the non-hardened areas, and to lithographically print images from said plate to the receiving medium.

14. The method of claim 1 wherein said thermosensitive layer is soluble or dispersible in emulsion of ink and fountain solution, and said plate is a wet plate.

24. The method of claim 1 wherein said plate is exposed on an imaging device off the press and then mounted onto a plate cylinder of a lithographic press for on-press development with ink and/or fountain solution, and lithographic printing.

25. The method of claim 1 wherein said plate is mounted on a plate cylinder of a lithographic press for the imagewise infrared laser exposure, on-press development with ink and/or fountain solution, and lithographic printing.

26. A method of lithographically printing images on a receiving medium, comprising in order: (a) mounting onto a plate cylinder of a lithographic press a lithographic plate comprising (i) a substrate; and (ii) a thermosensitive layer capable of hardening through polymerization or solubilization through decomposition upon exposure to an infrared laser radiation, the non-hardened or solubilized areas of said thermosensitive layer being soluble or dispersible in and on-press developable with ink and/or fountain solution, and said thermosensitive layer exhibiting an affinity or aversion substantially opposite to the affinity or aversion of said substrate to at least one printing liquid selected from the group consisting of ink and an adhesive fluid for ink; (b) imagewise exposing the plate with the infrared laser radiation to cause hardening or solubilization of the thermosensitive layer in the exposed areas; and (c) operating said press to contact said exposed plate with ink and/or fountain solution to remove the thermosensitive layer in the non-hardened or solubilized areas, and to lithographically print images from said plate to the receiving medium.

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments
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☐ 3. Document ID: US 6387595 B1

L17: Entry 3 of 3

File: USPT

May 14, 2002

DOCUMENT-IDENTIFIER: US 6387595 B1

TITLE: On-press developable lithographic printing plate having an ultrathin overcoatAbstract Text (1):

This invention discloses an on-press developable lithographic plate comprising on a substrate a photosensitive layer and a top ultrathin ink and/or fountain solution soluble or dispersible overcoat with a coverage of 0.001 to 0.150 g/m.<sup>sup.2</sup>. The incorporation of such an ultrathin overcoat can provide excellent white light stability, high contrast, excellent ink receptivity, and fast on-press development.

US Patent No. (1):6387595Brief Summary Text (2):

This invention relates to lithographic printing plates. More particularly, it relates to on-press developable lithographic plates having on a photosensitive layer an ultrathin overcoat.

Brief Summary Text (7):

On-press developable lithographic printing plates have been disclosed in the literature. Such plates can be directly mounted on press after exposure to develop with ink and/or fountain solution during the initial prints and then to print out regular printed sheets. No separate development process before mounting on press is needed. Among the patents describing on-press developable lithographic printing plates are U.S. Pat. Nos. 5,258,263, 5,407,764, 5,516,620, 5,561,029, 5,616,449, 5,677,110, 5,811,220, and 6,014,929.

Brief Summary Text (8):

An on-press developable lithographic plate generally comprises, at least, a substrate

and a photosensitive layer. In order for an on-press developable plate to be useful, the non-hardened (for negative working plate) or the solubilized (for positive working plate) areas of the photosensitive layer should be able to be cleaned off completely on press with ink (for waterless plate) or with ink and/or fountain solution (for wet plate) during the initial press operation. Acceptable printed sheets should be achieved within limited impressions, preferably less than 5 impressions. The non-hardened or solubilized areas of the photosensitive layer should be able to be penetrated, softened, and dispersed or dissolved by ink and/or fountain solution within seconds; the softened, and dispersed or dissolved areas of the photosensitive layer will be absorbed by ink and/or fountain solution, and/or removed by the press offset roller and printing papers. Considering the limited amount of ink or fountain solution on a printing press and the high viscosity of the ink, it is very difficult to obtain a plate which is non-tacky and can be developed on press quickly and cleanly. Therefore, on-press developable lithographic plates have more stringent design criteria than conventional lithographic plates developed with liquid developers.

Brief Summary Text (9):

While an on-press developable lithographic plate consisting of a substrate and a photosensitive layer is useful, it often suffers from slow roll-up and ink scumming during on-press development process.

Brief Summary Text (10):

On-press developable lithographic plates having an overcoat on a photosensitive layer has been disclosed in the patent literature, including U.S. Pat. Nos. 5,677,110, 5,599,650, 5,677,108, and 5,997,993. Here, one purpose of the overcoat was to reduce tackiness and/or protect the photosensitive layer and substrate from humidity attack. The overcoat was coated at a coverage of 0.25 to 0.32 g/m.<sup>sup.2</sup>. Such a high coating thickness is required to provide sufficient tackiness reduction and humidity impermeability.

Brief Summary Text (13):

I have found that an on-press ink and/or fountain solution developable lithographic plate having on a substrate a photosensitive layer and a top ink and/or fountain solution soluble or dispersible ultrathin overcoat with a coverage of 0.001 to 0.150 g/m.<sup>sup.2</sup> can give excellent white light stability (for ultraviolet sensitive plate), high contrast (or short Stouffer tail steps), and excellent ink receptivity, while allowing fast on-press development without having initial ink-scumming.

Brief Summary Text (15):

It is an object of the present invention to provide an on-press ink and/or fountain solution developable lithographic printing plate with excellent white light stability (for ultraviolet sensitive plate), high contrast, and excellent ink receptivity, while allowing fast on-press development without having initial ink-scumming.

Brief Summary Text (16):

It is another object of the present invention to provide an on-press ink and/or fountain solution developable lithographic plate having on a photosensitive layer an ultrathin photo-insensitive overcoat with a coverage of from 0.001 to 0.150 g/m.<sup>sup.2</sup>.

Brief Summary Text (30):

Various additives may be added into the overcoat to enhance its performance. For overcoat deposited from a solution or dispersion, various additives, such as surfactant, wetting agent, defoamer, leveling agent, and dispersing agent, can be added into the overcoat formulation to facilitate, for example, the coating process. Certain plasticizer or surfactant may be added to facilitate the penetration of ink and/or fountain solution during on-press development process. Various nonionic surfactants and ionic surfactants can be used. For water-soluble or dispersible overcoat, the surfactants are preferably soluble in water. Examples of surfactants useful in this invention include polyethylene glycol, polypropylene glycol, and copolymer of ethylene glycol and propylene glycol, polysiloxane surfactants, perfluorocarbon surfactants, sodium dioctylsulfosuccinate, sodium dodecylbenzenesulfonate, and ammonium laurylsulfate. The surfactant can be added at from 0.1 to 50% by weight of the overcoat, preferably from 1 to 20%.

Brief Summary Text (37):

Photosensitive layer suitable for the current invention may be formulated from various photosensitive materials. The components ratios (such as monomer to polymer ratio) are usually different from conventional plates designed for development with a regular liquid developer. Various additives may be added to, for example, enhance on-press

developability. Various additives useful for conventional photosensitive layer can also be used. Such additives include pigment, dye, exposure indicator, and stabilizer.

Brief Summary Text (38):

Various surfactants may be added into the photosensitive layer to allow or enhance the on-press ink and/or fountain solution developability. Both polymeric and small molecule surfactants can be used. However, it is preferred that the surfactant has low or no volatility so that it will not evaporate from the photosensitive layer of the plate during storage and handling. Nonionic surfactants are preferred. The nonionic surfactant used in this invention should have sufficient portion of hydrophilic segments (or groups) and sufficient portion of oleophilic segments (or groups), so that it is at least partially soluble in water (>1 g surfactant soluble in 100 g water) and at least partially soluble in organic phase (>1 g surfactant soluble in 100 g photosensitive layer). Preferred nonionic surfactants are polymers and oligomers containing one or more polyether (such as polyethylene glycol, polypropylene glycol, and copolymer of ethylene glycol and propylene glycol) segments. Examples of preferred nonionic surfactants are block copolymers of propylene glycol and ethylene glycol (such as Tergitol MIMFOAM from Union Carbide, and Pluronic L43, L64, 1107, P103 and 10R5 from BASF); ethoxylated or propoxylated acrylate oligomers (such as polyethoxylated (20) trimethylolpropane triacrylate, polyethylene glycol (600) diacrylate, and polypropoxylated (6) trimethylolpropane triacrylate, SR415, SR610, and SR501, respectively, from Sartomer Company, Exton, Pa.); and polyethoxylated alkylphenols and polyethoxylated fatty alcohols (such as Triton X-100, Triton X-102, Triton X-165, Triton X-305, Triton X-405, Triton X-705, Triton X-45, Triton X-114, Triton CF-10, Triton CA, and Triton DF-12 from Union Carbide). The nonanionic surfactant can be added at from 0.1 to 30% by weight of the photosensitive layer, preferably from 1 to 15%.

Brief Summary Text (48):

The plate can be exposed through a photomask film with a conventional light source or can be directly exposed from a laser (or focused conventional light source, such as UV light) according to digital imaging information. For direct exposure (or called digital exposure), the laser or focused light is scanned across the plate, and no photomask is needed. The exposed plate is then mounted on a lithographic press to develop with ink and/or fountain solution and then print out regular printed sheets. Alternatively, the plate can be exposed on a plate cylinder of a lithographic printing press, and the exposed plate can be directly developed on press with ink and/or fountain solution and then print out regular printed sheets. The plate may be sensitized to a UV, visible, or infrared radiation. For direct digital imaging, a laser is usually used as the radiation source. Visible lasers (including violet laser) and infrared laser are currently widely used for graphic arts imaging, and can be used for the digital exposure of this invention. A plate sensitized to an infrared laser (such as laser diode or Nd/YAG laser) or a violet laser is especially useful for on-press imaging and development because of its white or yellow light stability.

Brief Summary Text (51):

For conventional wet press, usually fountain solution is applied (to contact the plate) first, followed by contacting with ink roller. For press with integrated inking system, the ink and fountain solution are emulsified by the various press rollers before transferred to the plate as emulsion of ink and fountain solution. The ink and fountain solution may be applied at any combination or sequence, as needed for the plate. There is no particular limitation in this invention. The recently introduced single fluid ink by Flink Ink Company, which can be used for printing wet lithographic plate without the use of fountain solution, can also be used for the on-press developable plate of this invention.

Detailed Description Text (6):

The plate thus prepared was placed under a negative photomask having a 21-step Stouffer sensitivity guide and exposed to a UV light with an emission peak at about 364 nm for 2 min. using an INSTANT 2 VACUUM PRINTER 24.times.28 exposure device (manufactured by Berkey Technical Co., New York). A small unexposed area of the plate was exposed to a regular fluorescence office light for 100 min. (with the rest areas of the plate being covered) to test white light stability of the plate. The plate was then tested on a wet lithographic press (AB Dick 360) equipped with integrated inking system. The exposed plate was directly mounted on the plate cylinder of the press. The press was started for 10 rotations, and the ink roller (carrying emulsion of ink and fountain solution) was then applied to the plate cylinder to rotate until the plate showed clean background. The plate cylinder was then engaged with the blanket cylinder and printed with papers. The plate continued to run for a total of 200 printed sheets.



Current US Original Classification (1):  
430/302

CLAIMS:

6. The method of claim 1 wherein said overcoat is soluble or dispersible in emulsion of ink and fountain solution.

12. The method of claim 1 wherein said plate is exposed with an actinic radiation off the press and then mounted onto a plate cylinder of a lithographic press for on-press development with ink and/or fountain solution, and lithographic printing.

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L11: Entry 1 of 2

File: USPT

Jun 12, 2001

DOCUMENT-IDENTIFIER: US 6245481 B1

TITLE: On-press process of lithographic plates having a laser sensitive mask layer

US Patent No. (1):  
6245481Brief Summary Text (30):

For on-press developable wet lithographic plates, both the mask layer and the photosensitive layer can be soluble or dispersible in ink, fountain solution, or an emulsion of ink and fountain solution. However, the mask layer and the photosensitive layer can be soluble or dispersible in different press liquids selected from the group consisting of ink, fountain solution, and an emulsion of ink and fountain solution. For example, the mask layer can be fountain solution soluble or dispersible, and the photosensitive layer can be ink soluble or dispersible; or vice versa. During initial press operation, the fountain solution and ink (and the emulsion formed thereof) are capable of developing both the fountain solution soluble or dispersible layer (e.g., the mask layer) and the ink soluble or dispersible layer (e.g., the photosensitive layer). Therefore, on-press process of a wet plate (on a wet press) is unique in that two layers with opposite solubility or dispersibility (water soluble or dispersible vs. ink soluble or dispersible) can be developed simultaneously with ink and fountain solution.

Current US Cross Reference Classification (1):  
430/302

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☐ 2. Document ID: US 4147549 A

L11: Entry 2 of 2

File: USPT

Apr 3, 1979

DOCUMENT-IDENTIFIER: US 4147549 A

TITLE: Lithographic printing plate having addition polymerized areas and binder areas

US Patent No. (1):  
4147549Brief Summary Text (13):

Solvent developers particularly useful in preparing planographic printing plates include water; ethanol; 2-methoxyethanol; and solvent mixtures like water/ethanol, water/acetone and water/polyoxyethylene oleyl ether. Of these, water is particularly preferred. As is apparent to one with ordinary skill in the art the leaching effect during development can be optimized by adjusting the temperature of the solvent

developer. Also useful as solvent developers are printing press fountain solutions, greasy inks and ink-water dispersions and in a further embodiment such solvent developers can be used on press to develop an exposed plate thus incorporating the developing step with the press run.

Detailed Description Text (24):

An element was prepared from this solution and imagewise exposed as in Example VII. The cover sheet was removed and the surface of the sample was rubbed with a swab coated with a water-ink dispersion, Pitman Super Black D ink. The dispersion developed the plate and ink adhered imagewise to the exposed portions of the surface of the element.

Detailed Description Text (31):

The solution was coated with a doctor knife to a wet thickness of 0.006 inches on a 0.01 inch sulfite treated paper board, dried and exposed through a process transparency with the nuArc.RTM. Platemaker for 45 seconds. The imagewise exposed surface was developed as in Example VIII with a water-ink dispersion. Ink adhered to the exposed portions of the coating. The sample was placed on an offset type office copy machine, and used to print 100 offset negative copies of the original transparency on bond paper using a lithographic black ink.

Current US Original Classification (1):

101/453

Current US Cross Reference Classification (1):

101/456

Current US Cross Reference Classification (2):

101/457

Current US Cross Reference Classification (3):

101/460

Current US Cross Reference Classification (4):

101/462

Current US Cross Reference Classification (6):

430/302

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